

A Proposal to Run an Off-Cycle Eta Extension to Partially Meet Immediate Field Requirements for Downscaled Initialization Grids

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Recommendation: The ISST has recommended EMC immediately begin exploring running a limited-domain, Eta model extension through day eight, nested within the GFS solution. This is an effort to provide, as quickly as possible, WFO forecasters with high-resolution model data for use within IFPS in the medium range. The downscaled solution would reflect the coarser synoptic-scale GFS forecast influenced by NDFD-resolution terrain.

Description: Although not finalized, there are likely sufficient computing resources to allow EMC to run an extension of the Eta model on a 12-km grid from 84 to 192 hours on a small, windowed domain twice per day (0600 UTC and 1800 UTC). To allow quick implementation, EMC has identified a shuffling of computing blocks to allow for a more efficient Eta run to 84 hours. If correct, this would allow the 84-h run to be completed in about the same time it currently takes to get to 60 hours. The freed resources would then be used to run the windowed Eta extension to 192 hours. The size of the domain would ultimately be determined by the amount of computing resources available; but it is likely the primary domain would only cover the CONUS. Since this excludes Puerto Rico, and the Pacific and Alaska Regions, EMC has suggested that during forecast cycles when the primary extension is not being run (namely, 0000 UTC and 1200 UTC), it could run additional windowed solutions to provide comparable coverage to these OCONUS regions.

To take full advantage of the resulting native, full-resolution model information at EMC, the ISST has recommended that the Smart Initialization process be done centrally for this particular model run. The specific software used will need to be selected and/or revised from several applications currently available. The centralized process will allow detailed vertical information to be used in the downscaling, but not require all the fields be distributed to the WFOs. After the Smart Initialization process is applied, the 5-km surface grids would be distributed to the WFOs, primarily using regional wide area networks. The specific parameters distributed are not fully known, but would include wind, temperature, dew-point temperature, max/min temperature, and precipitation.

The products distribution grid would be an appropriate AWIPS grid. EMC would bit-mask the points that are outside the computational domain, which is something that AWIPS software can handle. Only the coastal offices would notice that there are missing points. Available bandwidth on the regional WANs needs to be fully investigated to make sure it is adequate. If not, this is one area additional resources may be needed.

Benefits: This relatively simple change in modeling configuration at EMC would provide badly needed initialization grids through the 8-day forecast period currently

being used within the IFPS. Each office is required to introduce a new day-8 forecast by 1800 UTC each day. The current general practice is to either stretch the day 7 forecast through day 8 (essentially a persistence forecast) or cut and paste a different intervening day that the forecaster feels somewhat matches the anticipated weather for day 8.

Another technique oftentimes used involves cutting and pasting day 7 into day 8, then applying a gridded 24-hr model trend (day 7 to day 8) to the day 8 grid. The reason many forecasters don't use the available GFS grids is that the currently distributed grids are too coarse in the vertical and horizontal to provide an acceptable first guess – especially in areas of complex terrain. Since this current approach is ad hoc, day 8 immediately starts with boundary discrepancies; it is demanding on forecaster resources and likely leads to less than optimal forecast quality.

The proposed Eta extension would provide a full-physics, high resolution simulation that reflects the interaction of the synoptic guidance provided by the GFS with detailed terrain. It would at least provide the forecaster another choice, namely, to use the new objective guidance (contingent upon whether the forecasters are comfortable with the GFS solution). If the forecasters across several CWAs liked the GFS solution, they would have the option to initialize many of the day 8 grids from the Eta extension and have an immediate match across the CWA boundaries. Thus, this Eta extension would provide a better avenue for objective model guidance to impact the GFE forecasts and would decrease forecaster workload, both resulting in an overall improvement in forecast quality and consistency.